WHAT IS CLAIMED IS:

1. A working control device comprising:

a configuration characteristic extraction unit

5   obtaining configuration information about

characteristics of a three-dimensional configuration

from design data of an object workpiece;

a working case storage unit storing working

conditions, as a working case, of the working

10 conducted in the past;

a case searching unit searching out the working

case from the working case storage unit on the basis

of the configuration information;

a working condition setting unit determining

15 the working conditions based on the working case

searched out by the case searching unit; and

a control unit controlling a working machine on

the basis of the working conditions.

2. A working control device according to Claim

20 1, further comprising:

a judgment criterion storage unit stored with

information serving as a judgment criterion for the

working conditions,

wherein the working condition setting unit

25 determines the working conditions based on the

information of the judgment criterion storage unit

and on the working case searched out by the case

searching unit.

3. A working control device according to Claim 1, further comprising:

a pre-working input unit accepting an input of

5   information about the object workpiece,

wherein the working condition setting unit determines the working conditions based on the information given from the pre-working input unit and on the design data.

10   4. A working control device according to Claim 1, further comprising:

a monitoring unit obtaining information of the working machine when the control unit controls based on the working conditions; and

15   a working case registration unit having the working case storage unit stored with the working machine information obtained by the monitoring unit in a way that makes it as a working case mapping to the configuration information.

20   5. A working control device according to Claim 1, further comprising:

a monitoring unit obtaining information of the working machine when the control unit controls based on the working conditions;

25   a working case registration unit having the working case storage unit stored with the working machine information obtained by the monitoring unit

in a way that makes it as a working case mapping to the configuration information; and

a post-working input unit accepting an input of information about whether the working is preferable

5 or not,

wherein the working case registration unit has the working case storage unit stored with the working case, corresponding to the information accepted by the post-working input unit.

10   6. A working control device according to Claim 1, wherein the configuration characteristic extraction unit divides a surface of the object workpiece represented by the design data into polygons, obtains coordinates of vertexes of these

15 polygons as X-, Y- and Z-values in the case of being expressed by values in X-, Y- and Z-direction, obtains minimum and maximum X-values, minimum and maximum Y-values and minimum and maximum Z-values among all the vertexes, obtains a maximum X-axis

20 directional length by subtracting the minimum X-value from the maximum X-value, obtains a maximum Y-axis directional length by subtracting the minimum Y-value from the maximum Y-value, and obtains a maximum Z-axis directional length by subtracting the minimum Z-

25 value from the maximum Z-value.

7. A working control device according to Claim 6, wherein the configuration characteristic

extraction unit projects all the polygons onto an X-Y plane on which a lowermost part of the object workpiece is positioned, obtains a volume of a polygon pole created by connecting respectively the

5 vertexes of each polygon to corresponding vertexes of the polygon projected onto the X-Y plane, obtains a volume of the object workpiece by repeating this calculation with respect to all the polygons, and obtains a removal volume by subtracting this from a

10 volume obtained by multiplying the maximum X-axis directional length, the maximum Y-axis directional length and the maximum Z-axis directional length.

8. A working control device according to Claim 1, wherein the configuration characteristic

15 extraction unit judges whether a normal line of the polygon is parallel with a working axis or not, and classifies the polygon exhibiting the parallelism according to a value in the Z-axis direction.

9. A working control device according to Claim 1, wherein the configuration characteristic

20 extraction unit extracts concave shape parts of the object workpiece represented by the design data, and obtains a concave shape radius dimension having a minimum radius in the concave shape parts.

10. A working control device according to Claim

25 1, wherein the configuration characteristic extraction unit extracts concave shape parts of the

object workpiece represented by the design data,
classifies the concave shape parts according to a
radius dimension, obtains an areal size of the
concave shape part according to this radius dimension,
5   and obtains a radius dimension having a maximum areal
size.

11. A working control device according to Claim
1, wherein the configuration characteristic
extraction unit divides a surface of the object
10   workpiece represented by the design data into
polygons, compares, in the case of representing the
coordinates of the vertexes of these polygons in
values in the X- Y- and Z-directions, Z-axis values
of the vertexes of the polygons excluding the
15   polygons having fitting surfaces to the working
machine and the polygons abutting on these fitting
surfaces, and obtains a minimum Z-axis value as a
maximum depth of the object workpiece.

12. A working control device according to Claim
20   1, wherein the configuration characteristic
extraction unit divides a surface of the object
workpiece represented by the design data into
polygons, judges whether or not a normal line of the
polygon is parallel with the working axis, classifies
25   the polygons into the polygons exhibiting the
parallelism and the polygons exhibiting no
parallelism, obtains a working range by grouping the

polygons including shared edges with respect to each classification, and obtains the edges, as a working range boundary line, which are not shared with other polygons in each group.

5   13. A working control device according to Claim 1, wherein the configuration characteristic extraction unit obtains blank dimensions by adding a working margin in the working case searched out by the case searching unit to the maximum X-axis

10   directional length, the maximum Y-axis directional length and the maximum Z-axis directional length.

14. A working control device according to Claim 1, further comprising:

a monitoring unit obtaining information of the

15   working machine when the control unit performs the control based on the working conditions;

a post-working input unit accepting an input of information about whether a result of the working is preferable or not when performing the control; and

20   a working case registration unit having the working case storage unit stored with the working machine information obtained by the monitoring unit and information about whether a result of the working is preferable or not in a way that makes it as a

25   working case mapping to the configuration information, wherein in case the result of the working in the working case searched out by the case searching

unit is preferable, the working condition setting
unit determines the working conditions based on the
working case.

15. A working control device according to Claim
1, wherein the case searching unit searches the
working case database by using the configuration
information obtained from the configuration
characteristic extraction unit as a search key, and
thus searches out a working case mapping to the
configuration information falling within a
predetermined range.

16. A working control device according to Claim
1, wherein the working machine is a cutting machine,
        the monitoring unit measures a main shaft load
state of the working machine, and
        the control unit, in case the measured main
shaft load is out of a predetermined range, adjusts a
feeding speed of the cutting machine so as to fall
within the predetermined range.

17. A working control device according to Claim
1, wherein the working machine is a cutting machine,
        the monitoring unit measures a main shaft load
state of the working machine, and
        the control unit, in case the measured main
shaft load is out of a predetermined range, adjusts a
the number of revolutions of the main shaft of the
cutting machine so as to fall within the

predetermined range.

18. A working control device according to Claim
1, wherein in the case of using a plurality of tools,
the working condition setting unit compares a cutting
5   residual quantity of the tool to be used ahead with
an allowable range of the tool to be used next, and,
if the cutting residual quantity of the tool to be
used ahead exceeds the allowable range of the next
tool, sets so that the cutting residual quantity of
10   the tool to be used head falls within the allowable
range of the next tool by changing, adding or
deleting the tool.

19. A working control device according to Claim
1, wherein in the case of using a plurality of tools,
15   the working condition setting unit compares a cutting
residual quantity of the tool to be used ahead with
an allowable range of the tool to be used next, adds
a tool used between the tool to be used ahead and the
tool to be used next if the cutting residual quantity
20   of the tool to be used ahead is over an upper limit
of the allowable range of the next tool, compares the
cutting residual quantity of the tool to be used
ahead with the allowable range of the tool to be used
next if the cutting residual quantity of the tool to
25   be used ahead is under a lower limit of the allowable
range of the next tool, and deletes the tool to be
used next if the cutting residual quantity of the

tool to be used ahead is within the allowable range
of the tool to be used next.

20. A working control program for making a
computer execute steps of:

5   obtaining configuration information about
characteristics of a three-dimensional configuration
from design data of an object workpiece;

searching out a working case on the basis of
the configuration information from a working case
10   storage unit storing working conditions, as a working
case, of the working conducted in the past;

determining the working conditions based on the
working case; and

controlling a working machine on the basis of
15   the working conditions.

21. A working control system comprising a
working machine and a working control device for
controlling the working machine,

the working control device including:
20   a configuration characteristic extraction unit
obtaining configuration information about
characteristics of a three-dimensional configuration
from design data of an object workpiece;

a working case storage unit storing working
25   conditions, as a working case, of the working
conducted in the past;

a case searching unit searching out the working

case from the working case storage unit on the basis
of the configuration information;

a working condition setting unit determining
the working conditions based on the working case
5   searched out by the case searching unit; and

a control unit controlling a working machine on
the basis of the working conditions.

22. A working control device according to Claim
1, further comprising a judgment criterion storage
10   unit having a tool library stored with information of
usable tools,

wherein the working condition setting unit
determines a minimum tool diameter necessary for the
cutting/working on the basis of the design data and
15   the usable tool information, determines a target time
T of the cutting/working on the basis of the working
case searched out by the case searching unit, adds
the tools in sequence from the tool having the
minimum tool diameter, calculates a time Tn in the
20   case of effecting the cutting/working with the tools
inclusive of an n-th tool, repeats a process of
calculating the time Tn by adding the tools till the
time Tn becomes shorter than the target time T, and
determines the using tool from among the n-pieces of
25   tools at a point of time when the time Tn becomes
shorter than the target time.

23. A working control device according to Claim

1, further comprising a judgment criterion storage
unit having a tool library stored with information of
usable tools,

wherein the working condition setting unit
5   determines a minimum tool diameter necessary for the
cutting/working on the basis of the design data and
the usable tool information, adds the tools in
sequence from the tool having the minimum tool
diameter, calculates a time Tn in the case of
10   effecting the cutting/working with the tools
inclusive of an n-th tool, repeats a process of
calculating the time Tn by adding the tools till the
time Tn becomes shorter by a predetermined value than
a time Tn-1 in the case of effecting the
15   cutting/working with the tool inclusive of an (n-1)th
tool, and determines the using tool from among the
(n-1)-pieces of tools at a point of time when the
time Tn does not become shorter by the predetermined
value than the time Tn-1.
20   24. A tool determining method based on a
working control device comprising a configuration
characteristic extraction unit obtaining
configuration information about characteristics of a
three-dimensional configuration from design data of
25   an object workpiece, a judgment criterion storage
unit including a tool library stored with information
of usable tools, a working case storage unit storing

working conditions, as a working case, of the working

conducted in the past, a case searching unit

searching out the working case from the working case

storage unit on the basis of the configuration

5   information, a working condition setting unit

determining the working conditions based on the

working case searched out by the case searching unit,

and a control unit controlling a working machine on

the basis of the working conditions,

10   the working condition setting unit executing

steps of:

determining a minimum tool diameter necessary

for the cutting/working on the basis of the design

data and the usable tool information;

15   determining a target time T of the

cutting/working on the basis of the working case

searched out by the case searching unit;

adding the tools in sequence from the tool

having the minimum tool diameter and calculating a

20   time Tn in the case of effecting the cutting/working

with the tools inclusive of an n-th tool;

comparing the time Tn with the target time T

and repeating a step of calculating the time Tn by

adding the tools till the time Tn becomes shorter

25   than the target time T; and

determining the using tool from among the n-

pieces of tools at a point of time when the time Tn

becomes shorter than the target time.

25. A tool determining method based on a working control device comprising a configuration characteristic extraction unit obtaining

5 configuration information about characteristics of a three-dimensional configuration from design data of an object workpiece, a judgment criterion storage unit including a tool library stored with information of usable tools, a working case storage unit storing

10 working conditions, as a working case, of the working conducted in the past, a case searching unit searching out the working case from the working case storage unit on the basis of the configuration information, a working condition setting unit

15 determining the working conditions based on the working case searched out by the case searching unit, and a control unit controlling a working machine on the basis of the working conditions,

the working condition setting unit executing:

20 a step of determines a minimum tool diameter necessary for the cutting/working on the basis of the design data and the usable tool information;

a step of adding the tools in sequence from the tool having the minimum tool diameter and calculating

25 a time Tn in the case of effecting the cutting/working with the tools inclusive of an n-th tool;

a step of comparing a time Tn-1 in the case of

effecting the cutting/working with the tools

inclusive of an (n-1)th tool with the time Tn, and

repeating a process of calculating the time Tn by

5   adding the tools in case the time TN becomes shorter

by a predetermined value or above than the time Tn-1;

and

a step of determining the using tool from among

the (n-1)-pieces of tools at a point of time when the

10 time Tn does not become shorter by the predetermined

value or above than the time Tn-1.

26. A tool determining program for making a

computer comprising a configuration characteristic

extraction unit obtaining configuration information

15 about characteristics of a three-dimensional

configuration from design data of an object workpiece,

a judgment criterion storage unit including a tool

library stored with information of usable tools, a

working case storage unit storing working conditions,

20 as a working case, of the working conducted in the

past, a case searching unit searching out the working

case from the working case storage unit on the basis

of the configuration information, a working condition

setting unit determining the working conditions based

25 on the working case searched out by the case

searching unit, and a control unit controlling a

working machine on the basis of the working

conditions, execute steps of:

determining a minimum tool diameter necessary for the cutting/working on the basis of the design data and the usable tool information;

5   determining a target time T of the cutting/working on the basis of the working case searched out by the case searching unit;

adding the tools in sequence from the tool having the minimum tool diameter and calculating a

10   time Tn in the case of effecting the cutting/working with the tools inclusive of an n-th tool;

comparing the time Tn with the target time T and repeating a step* of calculating the time Tn by adding the tools till the time Tn becomes shorter

15   than the target time T; and

determining the using tool from among the n-pieces of tools at a point of time when the time Tn becomes shorter than the target time.

In the invention, the above components can be

20   combined to the greatest possible degree.